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AGRICULTURAL EDUCATION IN JAVA.

By M. Barrowcliff.

A few words only suffice to indicate the importance to Java of her agricultural industries. Having an area, partly mountainous, of roughly 50,000 square miles, this suffices to support a population of over 30,000,000; 600 to the square mile.

Travelling from Batavia to Sourabaya one sees practically the whole land to be under cultivation. In East Java, an undulating plateau irrigated by streams from the higher mountains, every hill even is terraced to its summit, each terrace being a padi sawah. Owing to the water supply being under exact control and to a system of co-operative labor the land here is under continuous cultivation, bearing three crops in two years, and a glimpse up many a miniature valley will reveal padi in all its stages, from being sown to being reaped. Here little else but rice is to be seen but on the low lying alluvial lands of the West the padi crop alternates with sugar or tobacco as the case may be.

In addition to the enormous quantity of rice required by the population, of which all but a small proportion is home grown, there are produced annually 1,400,000 tons of sugar, 41,000 tons of tobacco, coffee 16,000 tons, tea 12,500 tons, cinchona bark 10,000 tons, besides rubber, copra, cocoa, pepper, etc., in the exploitation of which are invested large amounts of European capital.

It is not surprising therefore that the Dutch authorities have considered it essential to establish in Java a large and well organized Agricultural Department, or, in view of the fact that the scientific work required for the great export industries under European control is mainly carried out in experiment stations financed by the planters themselves, that the work of a large proportion of the staff of the Department is directed towards the improvement of the agriculture of the natives, to enable the land to meet better the needs of the large and growing population on whose numbers and well being the prosperity of the country so largely depends.

As however the value of such work would be little without adequate means being available for introducing any improvements effected into the common agricultural practice, and as it seemed that serious attempts were being made to grapple with this problem by the development of measures of agricultural education throughout the country, the writer endeavoured in the course of a recent short visit to obtain some insight into the nature of this work and of the lines on which it is intended to develop, in the hope that some account of it might prove of interest.

The earliest educational institution established was the "Agricultural School," in which the instruction given is mainly theoretical, and unaccompanied by practical field work. This however was found unsatisfactory, the youths turned out evincing little desire to return to the sawahs and usually taking up less strenuous careers.

On the other hand the "Culture School" at Buitenzorg, in which are some fifty students mostly supported by Government, and mainly sons of well-to-do native cultivators and Eurasians wishing to qualify for posts of some responsibility on the plantations, met with unqualified success. The course is one of 3 years and the curriculum essentially practical in its character. Attached to the school are some 12 acres of land on which the students themselves work daily from 6-9 a.m.

Here may be seen in progress experiments on the effects of cultivation, rotation of crops, green manuring, fertilisers the respective merits of planting padi broadcast and from dry and wet nurseries, the cultivation of "second crops" such as sugar, tapioca, maize, the earth-nut, fodder grasses, soy beans and other legumes, etc.: whilst close at hand is the experimental station for seed distribution, the work of which—to be presently indicated—comes within the purview of the students also.

After the morning's work in the fields is finished classes in arithmetic, elementary science, geography and simple bookkeeping are attended.

As goes almost without saying the field work is carried out on a commercial basis and strict account kept of the factors entering into cost of production, so that the merits of different crops and different modes of procedure may be subsequently reducible to terms of cash.

The success met with by this system justified it being made the basis of future development. The influence of a single institution such as this must, amongst a native population, necessarily radiate extremely slowly, and for many years to come be appreciable only in the neighbourhood.

It was therefore decided to establish similar experiment stations in every part of the country, at which should be carried

out practical demonstrations of the nature outlined above. To carry this out there were appointed for Java alone 12 agricultural instructors, men trained in the Agricultural Colleges of Holland.

Each of these instructors has a district of an average area of 4,000 square miles, in different portions of which experiment plots are being established.

The main lines on which the work is being carried out are:—

(1). The improvement by selection of the native varieties of padi and the introduction of new varieties obtained from the seed distribution station.

(2). The growing of "second crops."

(3). The use of fertilizers.

with similar demonstrations to those recounted in connection with the Culture-School of the values of various methods of cultivation.

Most of the land required is obtained from the natives on terms by which they carry out the work and receive the produce, being paid however when necessary for additional work not coming within the routine of the usual agricultural operations. In some instances the land is presented by the neighbouring planters.

The actual experimental plots for the padi cultivation are usually quite small, 25-30 feet square, but the possibility of misleading results being obtained due to localised differences in the soil are reduced by the repetition of each experiment in several parts of the field. By this means the usual size of the "farm," from 10-15 acres is sufficient for a large number of trials to be carried out.

A native house is acquired close at hand which serves as a laboratory for carrying out germination tests, weighings, etc., as an office for keeping the records required in the work of seed selection, and as a store house for the samples. The routine duties here are carried out by selected native youths paid at the current labour wage, 10 gulden per mensem, the more capable of whom are destined to become teachers when the contemplated extension of the system to the elementary schools is effected.

The instructor is responsible to the Director of Agriculture alone and is given a free hand in the choice of his methods and arrangement of his experiments. In addition to the actual field work he visits other parts of the district and arranges discussion with the local cultivators, telling them of his experiments and endeavoring to induce them to make trials also.

This is the keynote of the system,—to awaken an interest in experimentation and to indicate on what lines it is most likely to be productive. The adoption of an omniscient attitude on the part of the instructor would be highly detrimental to his chances of success, as he starts with nothing more than a sound knowledge of

fundamental agricultural principles and has to acquire for himself the requisite local knowledge of the peculiarities of the crops, the water and the soils.

Personality therefore enters the scheme to a large degree, but there can be little doubt that a man possessing the power of obtaining the respect of the peasants and of inspiring their confidence can succeed in overcoming the inertia and conservatism inherent in them and acquire an ever widening influence for progress.

[At the experiment station for seed distribution mentioned above, the work of breeding out the best strains from the numerous native varieties of rice, also experiments on the cultivation of padis acquired from other countries are carried out on a considerable scale. In this way are obtained by selection varieties having different characteristics and suitable to different localities.

One for instance notable for its good milling qualities would be for a district where rice is grown for export. Another, resistent towards drought, would be suitable for land on which the continuance of an adequate water supply is uncertain, whilst others are characterised by their high yields, flavour, etc.

These, after having been bred out at the seed station are distributed to the various experiment stations, where their suitability to the local soil is tested and from which they are introduced into the district.]

However it must always be from the training of the child that the main hopes of changing the customs of a people can be based, and it is intended, as previously indicated, to extend the scheme of agricultural education to the elementary schools also. Native teachers are being trained for the purpose by the instructors, and at an institution near Bandoeng, which unfortunately I had not time to visit.

At Tjinjiroean, in the school on the Government cinchona estate, this intention has, I was informed, already been carried into effect, and the children there learn as part of the curriculum to carry out the somewhat complex operations connected with cinchona and tea culture.

Those of us who, walking through a Malay kampong, have enquired the meaning of the tiny padi plots seen here and there and learnt that they were only *orang budak punya main main* can hardly doubt that similar lessons would not be distasteful to the young hopefuls of our own country.

Whether or not the principles embodied in this system may not eventually have to be adopted in European countries also may be a subject for debate, but for their tropical possessions, whose progress rests on the possession of a large and prosperous agricultural population it seems difficult to conceive of an educational

policy more likely to achieve the object of best fitting the child for the career which it is desirable—in the case of the vast majority—he should eventually follow.

Habits of industry would be inculcated, the inborn preference of the native for an out-door life fostered, and the sharpness of the transition from the school to the sawah softened almost to imperceptibility.

A boy thus trained should be less likely than he is at present to be influenced by the drowsy atmosphere of the school-house into choosing for his career the by no means strenuous one of the krani.

Finally, of not less importance would be the improvement in methods—and profits—that could not fail to result, and the lessening of the economic pressure tending to drive the present day cultivator to employment less fruitful though may be more remunerative.

I wish to acknowledge my indebtedness to His Honor the Director of Agriculture, Mr. H. J. Lovink, by whose courtesy I was permitted to make such drafts as I was able on the resources of the Department, to Dr. C. J. J. van Hall, and to the other scientific officers to whom I received introductions, who spared no pains in shewing me their work.

NOTE ON INSECT PESTS.

By C. B. Holman Hunt.

Under this heading I propose to give monthly remarks any noteworthy about pests reported from various sources; no estate names will be mentioned.

Coconut planters would do well to watch for the following pests which are causing some damage.

The Butterfly pest mentioned on page 23 of Vol I No. I of this Bulletin is prevalent this year in Perak, being found near Kuala Kangsar and Parit Buntar. For those who have mislaid their copy of the number referred to, the following particulars may be useful. The caterpillar is about 2 inches or more long, tapering somewhat from the middle to the neck and hind legs and with a head of about twice the diameter of the neck. The colour is green with a narrow purplish band running along the sides and crossing the hind end of the abdomen. The larvae are about full fed now. They spin the sides of one blade of a coconut leaf together, forming a tube, in

which one or more may live and they emerge, when hungry, to strip the blades in the neighbourhood to the mid-rib, which gives the tree a very tattered appearance. When full fed the larva turns into a long tapering reddish brown chrysalis, often covered with a waxy powder and from it emerges in a few weeks a brown pointed-winged butterfly, with a thick body rather like a moth but it has the knobbed antennae of a butterfly.

It is liable to fungus and Ichneumon pests. The best means of cure would be to collect the affected leaves when the larva is nearly full-grown and place them in a large box with a wire gauze front and a trap door in the top. Let the caterpillars be supplied with food and any Ichneumon-flies bred out can be let free among the coconut trees, while the butterflies can be detained and killed.

A similar pest attacks plantains and is appearing in great abundance this year in various districts. The difference in their mode of attack is that the larvae roll up like a huge cigar pieces of the plantain leaf, having gnawed it along a line parallel to the main rib. They may be dealt with as above.

A further pest on some coconut leaves in Krian is a Psychid moth, the larva of which tears off strips of coconut leaf and makes a ragged case, inside which it lives and from which only the head emerges to bite round patches out of the leaf.

It does much damage to the leaves, when it is abundant, but is easy to collect and should be dealt with as above. The female never emerges from the case and so all cases might be burnt if preferred. The male moth is now emerging.

A further pest reported near Singapore is a *Hispid* beetle, about $\frac{3}{10}$ of an inch long, exclusive of the antennae, which are about $\frac{1}{10}$ long. The head is black and pointed between the antennae, the thorax is oval and reddish yellow and the wing-cases are blue black and oblong, about the length of the antennae, head and thorax combined. The legs are very stumpy with only three apparent joints to the tarsus (see the article on Coleoptera in this months Bulletin).

They are very difficult to eradicate, if they get a footing, as they are very tenacious of life and have but few enemies. They live in the axils of the blades and in both stages nibble holes all over the leaf. Sprays would only be useful, if the poison covered the parts that they were going to feed on and on a high tree this would be difficult to ensure.

Collecting affected leaves and burning them would be the best preventive of a serious attack.

Brachartona catoxantha did some damage near Batu Gajah last year and the native owners of holdings refused to allow steps to be taken effectually to check the pest.

TAPPING EXPERIMENTS WITH OLD RUBBER AT KUALA LUMPUR.

By F. G. Spring.

In September 1909, tapping experiments were commenced by Mr. W. J. Gallagher, the then Director of Agriculture F.M.S., and were carried on under the supervision of Mr. J. W. Campbell, then Supt. Experimental Plantations, F.M.S., until 23rd June, 1910.

On the 23rd October 1910, the writer took over charge of the experiments and continued them on exactly the same lines as previously. The trees were approximately 10 years old at the commencement of the experiment, and had not been previously tapped.

The plot is divided into two sections, namely A and B, both on the same system of tapping, *i.e.*, half herring-bone, but A has three superimposed cuts 18 inches apart, tapped every day, while B has six superimposed cuts 9 inches apart, tapped alternate days. It will be seen that a similar area of bark, in both sets of trees, is removed in any given time. Tapping areas are so marked, and tapped in such a way, as to have the circumference of the trees both in A and B completely tapped in 4 years, one quarter of the tree being tapped each year, thus allowing 4 years for bark renewal.

The experiments are adjacent to each other and the trees under similar conditions, the slope, drainage and nature of the soil being practically the same in both sections.

The gouge knife was used in each plot. The distance of planting is rather irregular, as is most of the old clearings; it varies from 19 to 23 ft.

During the $2\frac{3}{4}$ years of tapping one or two trees were lost by the attacks of white ants and fungoid diseases but for each tree lost a substitute was included of similar age and approximately of equal girth. It is therefore unnecessary to make any allowance on that account.

Reference to the tables will show that the trees in experiment A, every day tapping, compared with the trees in experiment B, alternate days tapping, gave for the first year of tapping an excess of 252 lbs. latex rubber, 26 lbs. scrap rubber and 1 lb. bark shavings or a total of 279 lbs.

During the second year the excess is 233 lbs. latex rubber, 20 lbs. scrap rubber and 17 lbs. bark shavings, or a total of 270 lbs.

During the last period of tapping an excess of 311 lbs. latex rubber, 35 lbs. scrap rubber and 7 lbs. bark shavings or a total of 353 lbs. is shown. Over the period of $2\frac{3}{4}$ years the excess of total rubber in A over B is 902 lbs.

Expressed in percentages the excess is :—

First	year	... ...	44
Second	,,	... ...	54
Third	,,	... ...	75

About 4 per cent of this increase could be accounted for by the girth of the trees in A being slightly bigger than that of the trees in plot B. The girth measurements given in the table were taken at the completion of the experiments, when the trees were about 13 years old.

As tapping progressed the difference in yield between the two plots continues to become greater and therefore more in favour of A, and it would appear that this difference is likely to become greater.

As the figures clearly show the system of tapping conducted in experiment A gives a very much larger supply of rubber; the whole question therefore is one of labour. It is evident that the trees in A can be tapped more cheaply per day than the trees in B. But even if the cost were the same for one tapping and allowing that every day tapping will cost double that of alternate there is yet a balance of something like $1,500 at the end of 2¾ years in favour of A or roughly a difference of $545 per acre per annum calculating 100 trees to the acre. The writer thinks that the difference is sufficiently great to say that it does not pay to double the number of cuts and convert every day tapping to alternate.

It is not intended to convey the impression that the writer considers the method adopted in A the best system of tapping old trees but he merely gives here a comparison of different ways of tapping on the same system.

Experiment A

System of Tapping Single Quarter (Half-Herring-bone.)
Three cuts 18 inches apart. Twenty cuts to the inch.
Everyday Tapping.
No. of Trees in Experiment 100.
Average girth measured 3ft. from ground 40 inches.

Experiment B

System of Tapping Single Quarter (Half-Herring-bone)!
Six cuts 9 inches apart. Twenty cuts to the inch.
Alternate day tapping.
No. of Trees in Experiment 100.
Average girth measured 3ft. from ground 38 inches.
The amount of Rubber, Scrap, and Shavings recorded in this tables are their dry weights.

First Year.

Month.	Experiment A.						Experiment B.						Rain fall
	Latex Rubber		Scrap Rubber		Bark Shavings		Latex Rubber		Scrap Rubber		Bark Shavings		
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	
20th Sept. 1909	20	2	3	14			12	7	3	3½			1.22
October	53	7½	8	6½			57	13	5	15			2.97
Nov. ,,	58	3	7	9			52	9½	5	14½			6.41
Dec. ,,	69	12	7	1½			54	11	5	10½			5.41
January 1910	63	7	6	11½			42	3	3	1			4.42
Feb. ,,	66	13	6	12			40	11	2	12			4.35
March ,,	78	3½	7	2			43	2½	3	7			9.65
April ,,	62	4	6	5½			39	14½	3	3½			5.54
May ,,	71	3	6	9			50	15	3	8			5.29
June ,,	73	5	5	7			44	10½	4	1½			5.97
July ,,	72	6	4	11			48	4½	3	13½			5.54
August ,,	70	13	3	15			42	8	4	1½			4.36
Up to 19th Sept	44	10	2	3½			22	12	1	13			2.71
Total	804	9	76	11½	28 lbs 7 ozs		552	9½	50	8½	27 lbs 2 ozs		63.84

Second Year.

Month	Experiment A.						Experiment B.						Rain fall
	Latex Rubber		Scrap Rubber		Bark Shavings		Latex Rubber		Scrap Rubber		Bark Shavings		
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	
20th Sept. 1910	9	8	1	15			6	10	1	9½			1.36
October	57	11	9	1½			40	13	7	12½			6.68
November ,,	50	13	6	4½			33	8½	5	11			3.53
December ,,	53	5	7	0			38	5	7	2			9.23
January 1911	66	11	9	2			46	7	5	14			5.32
February ,,	57	9	6	6½			37	1	6	0			1.58
March ,,	47	8	6	13			27	12	5	11			10.88
April ,,	33	5½	6	0			18	11	4	4			15.39
May ,,	47	3½	7	6½			25	3	4	7½			3.04
June ,,	42	8	6	4			23	14	5	8			1.97
July ,,	50	7½	8	4			29	6	5	8			2.43
August ,,	57	12	8	15½			36	0	5	15			6.05
Up to 19th Sept	39	13½	5	2			18	0	2	1½			4.70
Total	614	3	88	10½	67 lbs 14 ozs		381	10½	68	2½	50 lbs 15 ozs		72.16

Third Year (9 months and 10 days).

Month	Experiment A.						Experiment B.						Rain fall
	Latex Rubber		Scrap Rubber		Bark Shavings		Latex Rubber		Scrap Rubber		Bark Shavings		
	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	lbs.	ozs.	
20th Sept. 1911	16	3½	2	10½			13	1½	2	3			2.53
October ,,	75	0	14	4½			41	10	8	7			16.77
November ,,	60	12½	10	13			40	15	6	11			12.25
December ,,	73	9½	9	5½			41	3½	7	4			11.06
January 1912	77	10	10	7			42	10	4	15½			4.76
February ,,	71	2½	8	10½			33	15½	4	15			10.50
March ,,	81	3	7	½			39	2	3	7			6.79
April ,,	77	6½	6	13½			39	12	3	8			10.76
May ,,	82	8	7	13½			49	7½	4	4			9.01
June ,,	83	3	6	8			45	11½	4	3½			5.24
Total	698	10½	84	6½	35 lbs 15 ozs		387	8	49	14	28 lbs 13 ozs		89.67

Total yield for 2 years 9 months and 10 days.

	Tota- Rubber		Latex Rubber		Scrap Rubber		Bark Shavings		Average girth	System of Tapping
Expt. A.	2499	7	2117	6½	249	12½	132	4	40 inches	Single quarter 3 cuts of 18 inches Every day tapping.
Expt. B.	1597	3	1321	12	168	9	106	14	38 inches	Single quarter 6 cuts of 9 inches alternate daytapping.

BARK-CANKER OF HEVEA IN JAVA.

By E. Bateson.

Hevea canker has been known in Ceylon and South India for many years, but it has not until recently been recorded from any other country. A bulletin* by Dr. A. A. L. Rutgers has now been published describing its occurrence in the Dutch East Indies.

The disease was first noticed in Java in 1911. In 1912 a circular describing the symptoms of canker was sent round to all rubber planters, asking them to say whether the disease was present on their estates. The replies showed that it was of wide occurrence. In Java it was recorded from the residencies of Batavia, Bantam,

* Mededeeling van de Afdeeling voor Plantenziekten, No. 2, Dept. van Landbouw, Nijiverheid en Handel 1912.

Preanger-Regentschappen, Samarang, Pasoeroean, and Kediri; it was also found in the south, east, and west of Borneo, and on the east coast of Sumatra. The number of estates on which it was stated to occur was only twenty-five, but it is expected that a more careful examination will reveal its presence on many others.

The bulletin is of a preliminary nature, and the account of the disease follows for the most part the description given by Petch. The measures suggested for dealing with it are mainly those which have been recommended in Ceylon, namely, excision of the diseased cortex; lessening the humidity of the plantation and admitting air and sunlight by removing intercrops, thinning out and pruning; and spraying the trunks of the trees with Bordeaux mixture. Disinfection of tapping knives with formalin is also recommended. When cutting out the diseased cortex it is not considered necessary to remove the cambium.

An important point brought to light by Dr. Rutgers' researches, which is not mentioned in previously published accounts of the disease, is that cankered areas frequently give rise to burrs. From the claret-coloured patch of diseased bark, strands of discoloured tissue pass upwards and downwards in the inner cortex, often spreading for a considerable distance. The living cortical cells surrounding these strands undergo division to form a secondary cambium, which cuts off lignified cells towards the inside, and in course of time forms a strip of wood in the cortex with the dead cells as nucleus. Figures are given of two sections showing the commencement of this process. In one a cambium has been formed on one side of a small group of cells, and in the other at least three such groups are surrounded by a single cambium. The growths which arise in this way have the form of flat plates, often reticulate at first, and sometimes not more than a millimetre thick. A photograph taken at an early stage of formation shows one which is over six inches in length.

This part of the paper is of great interest, not only because of the discovery of a hitherto undescribed effect of canker, but also because it is the first time any kind of excrescence on Hevea stems has been traced back to its origin. The idea that all these excrescences arise primarily as more or less spherical nodules, and that the large flat plates are formed by the fusion of these, is shown to be erroneous.

It seems quite possible that the method of burr formation found in cankered bark may go on in trees which have never been attacked by this disease, and that the presence of dead cells in the cortex, in whatever way they have been killed, may in certain cases provide a sufficient stimulus for the cutting off of a secondary cambium. The discovery may therefore prove to be of importance to

planters in Malaya as well as in countries where bark-canker occurs, especially if preventive measures are possible as they are with cankered trees, where obviously it is only necessary to excise all the discoloured tissues of the cortex in order to stop the formation of burrs.

Up to the present bark-canker has not been recorded from the F.M.S., and the absence of this troublesome disease is a point on which planters may well congratulate themselves. There is another disease affecting occasional trees on some estates which is sometimes mistaken for canker, but beyond the fact that the bark is slightly discoloured and either ceases to give latex or yields a diminished amount, the characteristic symptoms of canker are lacking.

Considering how widely *Phytophthora Faberi*, the fungus which causes bark-canker, is distributed throughout the tropics of Asia, Africa and America, it is surprising that it should not be found in this country, or if it does occur, that it should not have attacked rubber trees. The same fungus also causes a disease of the pods and stems of cacao, which was known in Ceylon over fifteen years ago, and which has since been recorded from Java.

There is no doubt that cacao has served as a source of infection for rubber, and the fact that all the countries from which the fungus has previously been recorded are countries in which cacao is grown, caused the immunity of Malaya from bark-canker to be ascribed to the absence of cacao. The occurrence of canker in Sumatra and Borneo, where cacao is not planted, deprives this argument of its weight, and makes the non-occurrence of the disease here all the more surprising. There is no reason to doubt the identification of the disease in the two countries mentioned, but it would be interesting to people in this country if the diagnosis were confirmed by a mycologist, to make sure that no other bark disease, for example the one which is known in this country, is being confused with canker.

Dr. Rutgers has recently paid a visit to the F.M.S., and he expressed the opinion that if bark-canker did occur here it would not do as much damage as it does in Java. The rainfall here is lower than in Java, the distance of planting is generally greater, and catch-crops are not so common. All these factors tend to cause a reduced humidity, and the lower the humidity the less able is the fungus of bark-canker to flourish.

THE PACKING OF PLANTATION RUBBER.

By L. Wray.

Being Extracted from Notes on the New York Rubber Exposition.

The packing of the samples left much to be desired. Some Estate Managers appear to have taken pains to fit their rubber to

their cases or their cases to their rubber, with the result that when the cases were opened the rubber turned out in a compact symmetrical packet, while the rubber of those who have disregarded this matter turned out as irregular and unsightly masses. Some went to the trouble of trimming their rubber to one size, but although the result attained was very satisfactory, it is a thing which could not well be done commercially and is, therefore, perhaps hardly to be recommended. In many cases the rubber was too wide for the boxes, and there was consequently an overlapping in the centre. In others the rubber was too narrow, and the spare space was filled by ramming in pieces of rubber on edge or by inserting pieces of wood. It may be considered by some that these are unimportant details, but it is just these small matters which make all the difference between an attractive and an unattractive exhibit, and what is true of an exhibit is equally true of the commercial product. If standard cases are to be used and there is much to be said in favour of the adoption of such a case, then the rubber should either be as wide as the case or half or a third or a quarter the width. To have cases, rolling mills and coagulating pans bearing no relation to each other is decidedly unwise, for the appearance of the rubber is spoiled and considerable space and freight is lost where such relation does not exist.

Many Manufacturers complained that, although the rubber itself was so clean that it was unnecessary to re-wash it when it came into the factory, still as there were constantly present amongst it chips and splinters of wood, they had to go to the trouble and expense of washing and vacuum drying it before it was fit for manufacturing purposes. Even after this treatment, wood sometimes still remained in it, and in certain cases proved a source of weakness in the manufactured article. It came out that in many instances the rubber reached the consumer in America in large rough, deal packing cases, and doubtless many of the pieces of wood complained of were derived from these unplaned boxes. Others probably came from the opening of the original cases in which it was sent from the estates to England, and probably from carelessness in handling the rubber in the warehouse. The bulk of the rubber is exported from Malaya in " Venesta " cases, which are quite smooth inside, but it must, in fairness, be stated that in many of these cases which were opened at the Exhibition chips of wood were present sticking to the rubber.* To remedy this defect it was suggested by some manufacturers that the rubber might be packed in some non-fibrous cloth or in zinc-lined boxes. Oiled paper, backed with

*A good deal of the rubber was taken out of unplaned boxes in Kuala Lumpur and re-packed in Venesta Cases. It is most likely that the chips of wood came from the original boxes and not from the Venestas—Ed.

a very open muslin, was also mentioned, as well as the paper, such as is used in packing butter, &c. There appear to be objections to all these proposals. Fibres from cloth or pieces of paper would be more troublesome to get rid of than chips of wood. Zinc lining would be sure to cause mould, by preventing ventilation during the voyage. Then oils have a very detrimental effect on rubber, and would inevitably cause paper treated with them to stick fast to the rubber. One sample of sheet rubber which was sent to the Exhibition was packed in paper such as has been previously mentioned. This sample took some hours' work to make it fit for exhibition, and even then there remained much paper sticking to it. There is a possibility that a coarse cloth, treated with acid in the same way as is done in making parchment paper, might be successful, but its cost would probably be high. The solution of this question is more likely to be found in the designing of a suitable packing case. "Venesta" cases certainly have advantages over some other cases, but they are undoubtedly capable of improvement. When a case is opened, it will be found that it is generally impossible to get the rubber out of it, until the four pieces of wood to which the lid is nailed have been removed. In doing this at all quickly, they will be broken, with the result that splinters of wood will find their way amongst the rubber and get embedded in it. Of all the "Venesta" cases which arrived from Malaya at the Exhibition, only one was badly smashed, but many others were more or less damaged, and for a voyage entailing a reshipment, greater strength is certainly desirable. If the pressure comes on them equally, they seem quite capable of withstanding it, but when the corner of one comes against the side of the another, that side often gives way.

A case should be so constructed that when the lid is removed, the rubber should slip out with ease, and it should not be necessary to break any wood, which might cause splinters, in opening it. It might be thought that if rubber can be put into a box it can be got out again with equal facility, but after a voyage the whole contents of the box become a more or less solid mass, and it requires only slight projections on the inner surface of the box effectually to prevent its removal. It should not be a difficult matter to design a satisfactory box for rubber, when once the conditions are formulated. These appear to be:—

(1). The material of which it is constructed should be sufficiently strong to stand a voyage involving a reshipment.

(2). They should have a smooth, planed, inner surface, and be close fitting, so as to exclude dust and dirt.

(3). They should be hard to tamper with in transit.

(4). They should be capable of being opened without its being necessary to fracture the wood.

(5). When open there should be no obstacles to the free exit of the contents.

(6). They should be capable of being re-closed for reshipment, in original cases, if necessary.

(7). The dimensions should be such as to take rubber from the size of mills most generally in use.

With a packing case made to comply with these conditions practically all difficulties due to the intrusion of foreign matter would disappear. Of course, great care must be taken to clean the boxes prior to use, and to keep the packing and unpacking rooms free from litter, which might stick to the rubber and prove difficult to get rid of subsequently. There is an American box of three-ply wood made by the Mongol Box Co., Louisville, Kentucky, which has some decidedly good points in its construction, and it is probable that a combination of the "Venesta" and "Mongol" box would meet the conditions. If other products are examined, it will be found that in most cases great care has been taken in their packing, and certainly a costly commodity like rubber should have as much care taken in its packing as articles not worth one-tenth of its price.

The delivering of rubber to the consumer in original cases is intimately mixed up with the branding of rubber. It was ascertained that there was sold in America in one month, under one particular Company's name, as much rubber as that company turns out in a year, hence it is easy to understand why rubber is repacked before delivery to consumers.

CINCHONA CULTIVATION IN JAVA.

By M. Barrowcliff.

The following notes were compiled after a visit to the Government Cinchona Plantations at Tjinjiroean, near Bandoeng, from information kindly supplied by Drs. Walther and Rant.

Elevation:—The optimum elevation for the cultivation of the cinchona plant is 5000 feet, and the limits at which it is desirable to grow it 4000-6000 feet. Plantations have been formed at 3000 and 8000 feet but not with great success, growth being poor and the yield low.

Soil:—The soil at Tjinjiroean, where the plant attains its maximum success, is a rich loose loam of volcanic origin, containing a large percentage of organic matter, and especially well supplied with phosphate and nitrogen. Although parts of the plantation are now over thirty years old manuring has, generally speaking, been found unnecessary.

Seed-beds :—These are prepared by digging out a depth of three or four feet of the soil and replacing it by fresh leaf mould from the forest. The beds are about four feet wide and sixty feet in length and are enclosed in low sheds of split bamboo, open to the air only on the side facing the lower slopes of the mountain. These serve as a complete protection against sun, rain, and winds blowing down from higher altitudes.

The seed (*Cinchona ledgeriana*) is thickly sown, two or three grams to the square meter, lightly covered with soil, and watered daily. It is important to keep the beds moist, but not so much so that mould formation occurs. After attaining a height of about an inch, which is in five or six months time, the seedlings are transplanted to other beds, shaded by attap coverings in the way usual in this country. In these they are planted 3 inches apart and remain so for approximately a further six months, at the end of which is a thinning out, half of the plants being removed and reset at distances of six inches.

After it has attained the height of 6-8 inches the young plant is ready for transference to the plantation proper. The *Cinchona succirubra* seed receives substantially the same treatment, and is grown mainly for the purpose of obtaining the " hybrid," by grafting *C. ledgeriana* on to it. For this it is thinned out to 12 inch distances and allowed to remain until two years old, at which age the plant is about three feet in height, when cuttings from ledgeriana trees of known high quinine content are grafted on at the base of the stem, the cut portions then being waxed over.

Two coolies can carry out some seven hundred of these graftings a day. In the course of another 6 months or a year these plants also are ready for the plantation.

Planting-out :—The cinchona plantations are now only made on *terraced* hill sides, it having been found by experience that terracing is essential for the maintenance of the fertility of the soil, by preventing the washing away of the surface,—the part of the soil richest in humus and in which the greatest amount of nitrate formation occurs—which cannot but be highly detrimental.

Another point worthy of note is that after felling the jungle is not burnt in the manner general in this country, this practice also having been found injurious to the soil's productiveness. After the leaves have died and fallen the wood is removed and such as is not taken by the population piled and fired in a separate place. The leaves go to form humus and thus increase the stock of nitrogen,—an early and valuable " green manuring."

The actual injury to the soil by burning vegetation on it may have been due to the large amount of organic matter already in it

(about 18%) becoming fired also, resulting in loss of nitrogen and the formation of a surface layer of charred vegetable matter.

Another sound agricultural practice that may be observed here is that of "trenching," by which between each row of plants and on each terrace are dug closed trenches 2-3 feet deep, 1 foot in width and 10-20 feet long. These ensure good aeration and act also as a further preventive against soil erosion.

The culture of cinchona as that of rubber being largely directed to the obtaining of good bark growth, the above observations should be of interest to the rubber planter.

Virgin land is planted with ledgeriana seedlings, older land—from which several crops of ledger have been taken with the succirubra-ledger hybrid.

The seedlings are planted thickly, up to 4000 per acre, and afford complete shade to the ground, thus obviating the necessity of weeding. It has been found best to keep the young plants in grass baskets of earth for some time and then to plant out basket and all.

At the age of about three years the weaker plants are removed and replaced by fresh seedlings. In the 4th, 5th and 6th years more are taken out, and of the original trees only the healthiest left. These are taken from the 6th to the 8th and succeeding years during which time the percentage of quinine in the bark is at its highest.

In this way a plantation once established is permanent, the trees taken out for bark removal being continuously replaced. This is the practice at Tjinjiroean and on the other Government estates; on some of the private estates however the alternative method of allowing all the trees on a given plot to attain an age of 7-8 years and then taking all out together is employed.

The trees are dug out with the main roots left intact, the root bark as well as that of the stem being rich in the alkaloids. The bark is readily stripped off by striking with heavy wooden mallets and is then dried on trolleys in the sun, the wood being purchased by the native population.

From the Government Plantations, which are 3150 acres in extent, averaging 1900 trees per acre, there are annually obtained about 2,000,000 pounds of bark having an average quinine sulphate content of 6½ to 7 per cent. The annual profit derived is, at the present price of bark (4 cents per unit of quinine sulphate per half kilogramme) about £35,000.

There is as yet no Government quinine factory in Java but it is likely that a small one will soon be erected, to make quinine sulphate sufficient to supply the needs of the country.

Although this cultivation is even now far from being unprofitable, it is almost certain that the near future will see a 20% rise in the price of the bark, from 4 to 5 cents per unit, a result of negotiations that have been taking place during the past year between the Java planters, under the guidance of Mr. H. J. Lovink, Director of Agriculture in Java, and the European manufacturers. A corresponding rise in the price of quinine sulphate, from 9¾d as at present to 11½d or 1/—per ounce, is therefore certain also, and at this it will probably remain for some years to come.

Any greater increase however is not probable, as thereby the consumption would be likely to be reduced, an eventuality it is of particular necessity for the planter to guard against. Any action on the part of the home manufacturers tending to bring this about, would be met by the erection of quinine factories in Java.

Another element that will influence the keeping of a moderate price is the action of the Indian Government, which is largely extending its planting policy, and in the course of another decade should be able to supply the growing needs of its population.

With regard however to the possible undertaking of cinchona cultivation as a Government enterprise in this country I am of opinion that it is not possible to make out a strong case in its favour. In the first place it is not likely that at the necessary elevation a soil will be found here that approaches in its suitability for the cinchona tree the volcanic soils of Java, secondly, the higher cost of labour, of which, as is to be seen from the details of the cultivation a very large amount is required, would make the proposition a much less profitable one than in that country, and lastly it is highly probable that the interests of the Java planters will always operate successfully against the price rising to such an extent that the present general practice of free distribution of the drug by Government and by private employers of labor in tropical countries is checked, this being the main factor bringing about the continual annual increase in the consumption.

INSECTS AND HOW TO DISTINGUISH THEM IN THEIR DIFFERENT STAGES.

Coleoptera.

By C. B. Holman Hunt.

Coleoptera or beetles are distinguished from other insects by the upper pair of wings being thickly chitinised and forming a pair of covers for the lower, meeting in the middle of the back. In some cases these are fused one to the other and the lower are absent. In

others they are very short and only reach a short way down the back, but almost all the Coleoptera are recognised in the adult stage by the most casual observer. In the early stages they are very diverse in form and may be soft and white, as is the grub of the Cockchaer or Rhinoceros beetle, worm-shaped with a hard shiny covering in the case of the Click beetle, hard and black with the cast skins carried on two spines near the tail and expanding like an umbrella over the body, as is the habit of the larva of the Tortoise-beetle or flat and black with flat processes extending on either side in a wood feeding larva, the adult of which is probably allied to the Glow-worms.

Coleoptera are divided into families which differ from one another in the number of the joints of the tarsus. The tarsus is the terminal segmented portion of the leg and may consist of 5, 4, or 3 joints including the last segment which bears claws. A further differentiation may be found in the shape of the head, which in most beetles is broader than it is long, but in one group of families including the Weevils and Brenthids the head is prolonged into a rod terminated with a stout pair of mandibles. This modification enables such beetles to bore holes in the bark, wood, shoots and fruits of plants, in which the eggs are laid and this group includes therefore a large number of insects of great interest to Planters and Agriculturists. They form a suborder known as the Rhynchophora.

The classification of the beetles is far too complicated for treatment in such an elementary article as this, but some mention may be made of a few principal pests and other interesting Beetles in Malaya.

The Tiger-beetles, or Cincindelidae, derive their English name from their voracity. There are many species in the F.M.S., they may be seen rising and flying for a short distance over dry roads. They generally have a greenish or reddish metallic sheen or yellowish spots on dull black Elytra or wing-cases. I have sometimes found them in hundreds settled on the leaves of rubber trees in the glare of a lamp arranged for the attraction of other insects; no doubt they were there to capture smaller creatures coming to the light. They are probably useful but undiscriminating aids to the planter. Some of the Tiger-beetles mentioned above were found with their jaws stuck to the leaves, through which they had bitten, but this was probably accidental, as they do not feed on plants. In the young stage they are also carnivorous.

Near the Cicindelidae come the Carabidae, which are also generally predaceous, though some eat plants, but they are rarely pests.

Next to these come the predaceous Water-beetles, the larvae of which have been known to attack tadpoles and even small fishes.

Next must be mentioned the Carrion Beetles, which feed, as the name implies in both stages on decaying animal matter.

The Rove-beetles or Staphylinidae may be recognised by the short wing cases scarcely covering half of the long bodies.

The Coccinellidae or Ladybirds may next be mentioned, they are most useful and feed on Scale-insects. They do much to help the planter and to neutralise the work of the Black-ants, which tend these pests. A scale attack on a tree may often be recognised by the stream of Black-ants climbing up and down a plant and generally Ladybirds may be found settled on the leaves preying on scales and also on Aphides. The Ladybirds are usually spotted, but some are plain red or yellow; they may be recognised by an examination of their tarsi, which are three-jointed and have the second joint dilated. The larvae are generally blackish with long soft bodies and slender legs. A very few of the Ladybirds are herbivorous and may be found feeding on pumpkin and occasionally other leaves.

There are several species of Elateridae or Click-beetles in Malaya. They can generally be easily recognised, as they are long beetles which when laid on their backs arch themselves backwards, give a click (whence their common name is derived), spring into the air and generally alight on their feet. Their larvae are the Wire-worms, which feed on the roots of grasses and other plants or under the bark of trees and do much damage. Some of the Click-beetles are large with a pair of eye-like marks on the Thorax.

The Buprestidae are like the Elateridae in form but cannot spring into the air. Many of them are of a lovely metallic green or bronze colour. Their wing cases are used in some Indian fabrics for ornamentation. The larvae are borers in trees.

The Lampyridae or Fireflies are easily recognised by their patches of phosphorescent light visible on the under surface of the body in both stages. They are of little economic importance.

There are many stag-beetles or Lucanidae in the Oriental region but the larger ones are not common in Malaya. The male usually only possesses the enlarged mandibles from which the name is derived. The larvae feed inside trees and may take years to mature.

The Scarabaeidae or Dung-beetles have often been observed to roll the food for their larvae into balls, bury it and then lay their eggs in it.

Near this family come the Leaf-chafers or Rose-beetles, which often do damage to the flowers of roses and leaves of other plants in the adult stage, while the larvae feed on the roots of small plants.

Among the largest beetles in Malaya are the Dynastidae, which include the Rhinoceros-beetle, the Black beetle of the coconut palm,

a very serious pest in the larval stage. To this group belongs *Xylotrupes dichotomus*, a brownish beetle, which has been found with its jaw stuck together with coagulated rubber. Its claws marks are sometimes to be found on the stem of leaves of rubber seedlings and it is probably guilty of gnawing off the shoots of those plants. The larva has been found in the rotten core of the Nebong and in rotten coconut trees.

The Cerambycidae or Long-horned beetles are strong fliers, with long antennae and strong toothed mandibles, with which they do much damage to trees. They are even more destructive as larvae which bore into the wood. An injection of strong tobacco juice will kill the borer when it is in its burrow or a pliable piece of sharpened and barbed wire may be used to drag it out.

Next these come the Chrysomelidae or Leaf-beetles which feed in both the larval and mature state on the leaves of plants.

Close to those come the Hispidae, of which a species has been found causing damage to young coconut leaves.

Near these come the Cassididae or Tortoise-beetles, the metallic colours of which are so difficult to preserve in a collection,

The last family to which I shall refer in this article is that of the Curculionidae or Weevils, they are provided, as I mentioned before, with a long snout and vary in size from that of a pins-head to about three inches long.

The chief pest in the family is the "Red Coconut-beetle," which bores in the larval stage into the stem of the coconut and very soon kills it. To reduce the danger of this pest and of the "Black Coconut-beetle," all fallen coconut trees have to be burnt and no refuse must be left in a coconut plantation.

COCONUT ESTIMATES.

[We have pleasure in publishing the following letter from Mr. R. W. Munro concerning certain criticisms that have been passed regarding the estimates drawn up by Mr. L. C. Brown, Inspector of Coconuts, F.M.S. It is obviously impossible to frame estimates that will meet every case, but we believe that the estimates in question can be, and have been, worked to. To do so requires most careful arrangement and management of the expenditure, selection of land, etc., and it is not expected that they will be automatically correct in every instance. ED.]

To

The Editor,

"Agricultural Bulletin."

Sir,

My attention having been called through a publication in the *Malay Mail* to an article which appeared some time ago in a paper

called the *Investor's Chronicle*, I sent a reply which the editor of our local paper was good enough to print for circulation, but it has since occurred to me that it would be for the benefit of a larger number of the community (who have a right to demand that their interests be guarded from these kind of criticisms) should you also feel disposed to make known through your columns the irresponsible statements of this armchair critic whoever he may be.

The article to which my attention was called was headed "More Coconut Experience," and the primary object of the article seemed to be to warn the investing public against following estimates which were published some time ago in the F.M.S. Official Bulletin* for bringing into bearing 500 acres of coconuts in the coast Districts of the F.M.S.

These estimates are criticised as being "optimistic," "inadequate," etc. etc., because a company which had bought an estate in partial bearing in land which I understand had been to a certain extent previously under tapioca and sugar, was unable to show after the first year's working the results which those responsible for the prospectus estimates had hoped for. Amongst other things the writer of the article states that on the estate in question "the expenditure on buildings was almost as many pounds sterling per acre as the *Bulletin* estimates gives dollars," also that "Hospital accommodation is omitted in the bulletin."

Here, again I am constrained to remark (1) on the estate in question having been bought *as an estate*.

(2.) That in all the copies of the Bulletin that I have seen, Hospital accomodation is carefully included.

I was shown a subsequent article (which I believe appeared in the same home paper) styled "More Coconut Estimates Miscarry" in which the writer refers to the annual report of a certain Lower Perak Company as being "another practical exposure of the myths appearing in the F.M S. Bulletin on coconut cultivation in the F.M.S.

"This property" he says, "is situated in a splendid coconut "district. The undertaking is run by practical Ceylon Planters as "an enterprise principally for the investment of their own capital. "The details were most carefully prepared, but the details to hand, "as regards expenditure, except as regards weeding, are totally at "variance with those published in the Bulletin."

"Less than two years have elapsed, and the report states that "the expenditure has quite upset the most carefully prepared calcu- "lations, &c." In the 1910 edition of the F.M.S. *Bulletin* which is doubtless the one referred to by the writer in the *Investor's Chronicle*

*Bull. No. 11. Coconut Cultivation, by L. C. Brown, also in *Agricultural Bulletin, F.M.S.*, Vol. 1. p. 117, Oct. 1912.

advice is given as to the maintenance of the land after planting, and until the trees reach maturity : there is also a very carefully worded paragraph dealing with the selection of land.

To any unbiassed person reading the *Bulletin* carefully it must be obvious that the estimates attached for opening up the land in the Coast Districts of the F.M.S. (it does not say anything about previously worked land in Province Wellesley or elsewhere) are based on the supposition that those responsible for the selection of land and the subsequent development of the same would be guided by the general remarks set out in the pamphlet.

It is by ignoring these, not by following them, that it becomes possible to show expenditure which " quite upsets the most carefully prepared calculations," so that efforts on the part of F.M.S. authorities to have the " Official Bulletin " revised would stand the chance of being thrown away. It is obviously impossible to revise any reasonable estimates so as to bring them in line with the extravagant, not to say reckless figures under which many planters now affirm that it is impossible to get work done. In many cases there is no attempt at combination as regards rates. This is specially noticeable in the splendid coconut district mentioned by our critic where so much Ceylon Planters' capital has been sunk, and with this knowledge I submit that it is, to say the least of it, unfair to call in question prices that practical and experienced men know have been, and can be, worked to.

We are not at all surprised to hear of dissatisfaction being expressed when we see around us so many instances of land being chosen and opened without any regard to immediate means of thorough and efficient drainage, and it is very hard, I admit, that the Investor-Planter should, by supporting an acknowledged sound industry, run the risk of having his judgement called in question.

I am, etc.,

24 January, 1913. Robt. W. Munro.

Banting, Selangor.

RETURNS REQUIRED BY THE LABOUR DEPARTMENT.

The Controller of Labour desires to draw the attention of all employers of Indian labourers to the fact that all business connected with the immigration of Indians is conducted in Penang. The quarterly returns required for the purpose of calculating assessment as well as all communications regarding recruiting and immigration should be addressed to the Deputy Controller of Labour, Penang.

The returns of labourers locally engaged should be forwarded by estate managers to the office of the Deputy or Assistant Controller who is known to visit the estate. All such returns from the

State of Perak should be sent to the Assistant Controller, Penang; from Kuala-Lumpur, Ulu Selangor and Ulu Langat Districts to the Assistant Controller, Kuala Lumpur; from Klang, Kuala Selangor and Kuala Langat Districts to the Assistant Controller, Klang; and from the whole of the State of Pahang to the Assistant Controller, Kuala Lumpur. Until a labour office is opened in Seremban, all such returns from employers in Negri Sembilan should be addressed to the Assistant Controller, Kuala Lumpur. When a labour office has been established at Seremban such returns should be furnished to the Deputy or Assistant Controller of Labour in charge at Seremban.

The quarterly returns of labourers required by section 113 (i) of the Labour Code should be sent similarly by each estate manager to the labour office for the District in which the estate is situated.

DEPARTMENTAL NOTES.

Mr. C. K. Bancroft, Mycologist, Department of Agriculture, F.M.S, left by S.S. "Assaye" on February 7th, on his way to British Guiana to take up the duties of Assistant Director of Agriculture there. Mr. Bancroft's work as Mycologist has been of great assistance to the agriculture of the F.M.S. and our pleasure at the prompt recognition of the value of his work is mixed with regret that his services are lost to Malaya. Mr. Bancroft joined the Department as Assistant Mycologist in July 1910, as was promoted to be Mycologist in January, 1912.

Mr. A. Sharples, Assistant Mycologist, Department of Agriculture, F.M.S., arrived at Kuala Lumpur and assumed his duties on January 30th.

NOTES ON THE SINGAPORE MARKET FOR STRAITS PRODUCE DURING FEBRUARY 1913.

Demand generally continues extremely dull, and there seems little prospect of any improvement at present.

Black Pepper.—Johore Pepper was offering freely during the month, and a considerable business was done at $20 to $19½, the market closing weak at the lower price.

White Pepper.—Prices kept fairly steady at about $34 for Sarawak and $35½ for better grades, quantities offering being very small.

Gambier.—Arrivals have been smaller than was expected, and the price in consequence has kept fairly steady at $7.60 to $7.75 in spite of the lack of demand from Europe.

Cube Gambier.—Fair Unpicked Cubes were in rather less demand at $12¾ and a small business was done in Malacca Cubes at $11¾ to $11½ closing distinctly easier.

Copra.—After a further advance the market went a little easier, but few sales were made at the decline, and the month closes with a good demand at about the following prices—Bally $12.10, Kayong $11.85, Pulo $11.75, Siantan $11.70.

Rubber.—Has been fairly steady, but at the close is somewhat easier. Closing values are:—

Fine Pale Crepe	$218
No. 2 Crepe	$200
Smoked Sheet	$214
Unsmoked Sheet	$209
Scrap Sheet	$130/140.

Tapioca.—Has declined further and the market dull at $7.27½ for Flake and $6 50 for Pearl.

Nutmegs.—Remain unchanged with only small business transacted.

Sago Flour.—Has kept steady at last prices with more supplies arriving. Closing prices are $3.85/$3.60 according to quality.

FEDERATED MALAY STATES.

Comparative Statement of Cultivated Rubber Exported during the Years 1913 and 1912.

Produced in	Exported during Jan. 1913.	Previously.	Total export during the year 1913.	Export during similar period of previous year.	Increase.
	lbs.	lbs.	lbs.	lbs.	lbs.
Perak	1,250,698	...	1,250,698	823,243	427,455
Selangor	2,620,176	...	2,620,176	1,352,473	1,267,703
Negri Sembilan	900,129	...	900,129	551,029	349,100
Pahang	16,277	...	16,277	3,831	12,446
Total ...	4,787,280	...	4,787,280	2,730,576	2,056,704

Exported viâ	To United Kingdom.		To Continent of Europe.		To Ceylon.		To America.		Total.	
	Jan.	To date.	Jan.	To date.	Jan.	To date.	Jan.	To date.	Jan.	To date
	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.	lbs.
Port Swettenham	2,539,463	...	325,933	...	183,107	...	...	...	3,048,503	...

KUALA LUMPUR,
12th February, 1913.

W. J. P. HUME,
Commissioner of Trade and Customs, F.M.S.

Abstract of Meteorological Readings in the various Districts of Malaya for the Month of January, 1913.

DISTRICT.	Mean Barometrical Pressure at 32° Fah.	Maximum in Sun.	TEMPERATURE.				HYGROMETER.				Prevailing Direction of Winds.	Total Rainfall.	Greatest Rainfall during 24 hours.
			Mean Dry Bulb.	Maximum.	Minimum.	Range.	Mean Wet Bulb.	Vapour Tension.	Dew Point.	Humidity.			
Kelantan, Khota Bahru	...	142.	78.1	82.16	72.80	9.36	75.1	.812	73.0	84.0	...	6.74	2.00
Malacca, Durian Daun Hos.	29.922	140.4	80.3	86.4	71.7	14.7	76.8	.876	...	87.	N.	2.52	1.54
N. Sembilan, Dist. Hospital Seremban	...	138.3	79.1	87.0	71.6	15.4	75.0	.795	72.2	80.	N.	5.30	1.35
,, Dist. Hos. K. Pilah	...	151.9	79.9	87.8	70.8	17.0	77.2	.850	75.5	85.	..	10.89	3.10
,, ,, Tampin	....	132.1	78.1	83.8	72.8	11.0	73.5	.760	70.4	78.	...	4.92	1.35
,, ,, P. Dickson	...	151.1	80.6	87.5	73.6	13.9	76.2	.825	73.3	79.	...	3.31	0.80
Pahang, ,, K. Lipis	...	...	78.1	85.0	67.0	18.0	73.7	...	...	...	...	7.60	1.04
Penang, ,, Penang	29.872	152.0	81.7	92.0	70.0	22.0	75.6	.796	71.4	74.	...	6.15	2.70
Perak, ,, Taiping	...	106.0	79.34	92.0	69.0	23.0	75.65	.839	...	84.	...	14.89	3.43
,, ,, Ipoh	...	...	80.39	92.0	68.0	24.0	75.09	.799	...	78.	...	9.21	2.71
,, ,, T. Anson	...	...	80.36	91.0	69.0	22.0	76.69	.869	...	85.	...	10.46	3.08
,, ,, P. Buntar	...	...	77.15	89.0	68.0	21.0	75.91	.881	...	95.	...	8.95	3.77
,, The Cottage	...	...	...	..	...	...	...	...	...	...	...	11.07	3.10
Selangor, General Hospital Kuala Lumpur	...	145.7	79.9	85.1	73.1	12.0	75.7	.851	72.9	79.	...	10.46	2.29
,, Dist. Hos. Klang	..	...	...	86.2	66.2	20.0	...	...	...	...	...	8.28	3.90
,, ,, K. Selangor	...	...	...	88.4	68.7	19.7	...	...	...	...	...	4.69	1.13
,, ,, Rawang	...	...	...	89.9	70.7	19.2	...	...	...	...	...	11.95	2.00
Singapore, Kandang Kerbau Observatory	29.913	162.6	76.4	92.0	73.0	19.0	76.0	.843	...	84.	N. E.	18.46	3.22